	1		MINE	
TOTAL		1/ MAP SYMBOL	ROCK	DESCRIPTION
		2/		The measured section is accessible from the road in Twenty Mule Team Canyon, a one-way loop off California Highway 190 in Furnace Creek Wash southeast of the Visitor Center, National Park Service, in Death Valley.
19.3				The section was measured by tape with the assistance of Carl J. Bowser, 1955.
182				Rocks concealed strictly along the line of section are shown projected. A geologic setting is provided by the reference in the following footnotes.
1945				1/ McAllister, J. F., 1970, Geology of the Furnace Creek borate area, Death Valley, Inyo County, California: California Div. Mines and Geology Map Sheet 14, with text, 9 p.
				2/ Top of section: N. 2° W., 2,060 m from U.S. Mineral Monument 40 on Monte Blanco.
				3/ Bend in section from N. 52° E. to N. 30° E. at point N. 11° W., 1,660 m from USMM 40. 4/ Section offset N. 41° W., 240 m from point N. 19° W., 1,300 m from USMM 40 to point N. 22°30' W., 1,520 m from USMM 40.
	200	Tf		5/ Base of section: N. 40° W., 1,140 m from USMM 40.
				Light-colored mudstone, tuffaceous sandstone, and minor limestone; upper half, nearly white from tuffaceous sediments
3,000-				increasingly pumiceous upward, generally concealed by alluvium or hillside mud crust. Sandstone ranges from very fine to coarse grained and where resistant is very calcareous, grading to sandy limestone, partly producing brown rubble. Algal laminated limestone is sparse. Measured section ends at deformed beds near fault contact with conglomerate in the
7,000				Funeral Formation of Pliocene and Pleistocene(?) age and lacks tongues of upper conglomerate (map symbol Tfcu) and evident upper member (map symbol Tfu) of the Furnace Creek Formation
			2000 (m) (w) (c)	
				Basalt in sill, olive-gray to medium-dark-gray, somewhat amygdaloidal, ends along strike about 100 m SE but persists NW, recurring at about same horizon as far as Zabriskie Point (about 4 km) where also highest basalt in Furnace Creek Fm.;
	6	Tfb		NRM anomalous polarity (normal, nearly vertical or very steeply south after correction for dip) Tuffaceous sandstone, interstratified mudstone, and minor sandy limestone. Sandstone is generally pinkish gray, partly
				very light greenish gray, very fine to coarse grained, calcareous where resistant, muddy where least resistant. Conglomeratic zone in mudstone about 20 m above base of unit contains sporadic clasts of volcanic rocks probably reworked from Artist Drive Formation
	55	Tf) - # - G - O	Trom Artist Drive Formation
				Gypsum and light-colored mudstone in main part of gypsiferous member. Massive gypsum, recrystallized (crystalloblastic in thin sections), contains varied amounts of clay in irregular segregations and is interstratified with predominant
2,500-				mudstone and some limestone, all veined with fibrous gypsum; massive and fibrous gypsum at surface dehydrates to white very fine grained bassanite and anhydrite; favorable exposures are rilled and steeply fluted. Lenses of coarse anhedral colemanite are sporadic in lower part of unit
	75	Tfg		
	14			
	17	Tfb		Basalt, probably sill intruded into wet sediments
	21	77.50	· · · · · · · · · · · · · · · · · · ·	Gypsum-bearing mudstone; many stringers of gypsum along and across bedding; minor lenses of coarse anhedral colemanite, as
	31	Tfg		at prospect adit; lower part of gypsiferous member
	3	Tfb		Basalt peperite, poorly exposed Light-colored mudstone, some gypsum stringers, generally concealed by alluvium on low terrace and in channel at road
				or by mud crust on hillside
	07	m.e.		
2,000-	87	Tf		
2,000		3/		Basalt in irregular sill, some peperite along upper contact; olive gray to medium dark gray, generally aphanitic, some
				1-mm vesicles. Thin section from 2.7 m above base, 4.5 m SE along strike, contains 40 percent plagioclase (An ₆₅), 9 percent olivine (nearly half is altered), 51 percent dark groundmass. CIPW norm of chemically analyzed sample within 1 m from top, about 45 m NW along strike, contains (in weight percent) 3.2 Q, 5.5 or, 31.7 ab, 33.8 an, 10.9 di, 3.8 hy,
	10	Tfb		4.8 mt, 1.9 hm, 3.4 il, 1.1 ap. Basalt at about 120 m SE along strike has plagioclase partly replaced by analcime and contains minor veins of gypsum or colemanite; normal polarity (NRM)
		7	XXXXXXXXX	Mudstone, light-greenish-gray and yellowish-gray, calcareous, extensively concealed by crust, 6 m at top of unit concealed by terrace gravel; widely spaced thin but notable beds of altered tuff and tuffaceous sandstone. Lowest sampled tuff,
			* XXXXXXXXXXX	5 m above base of unit, 10 cm thick, nearly white, very fine grained, altered to clinoptilolite, laminated with mudstone; highest sampled tuff, about 65 m above base of unit, very light greenish gray and very pale orange, very fine grained, and coarser part, 0.5 m higher, medium-grained tuffaceous sandstone, pale-yellowish-gray to very light greenish gray,
	77	Tf	*********	altered to clinoptilolite
			ARREARKAND OF THE OFF OFF OFF OFF	
	29	Tfa	10 10 U	Greatly altered basalt fragments in thin ill-defined beds, generally concealed by olive crust on boron-bearing efflorescence of thenardite; fragments, poorly sorted in beds of fine sand (pale olive) altered to analcime and montmorillonite, medium to coarse sand (pale olive), and very coarse sand to fine gravel (dusky yellow), containing analcime in ill-defined
1,500				stringers and a few microvugs. Irregular zones of gypsiferous mudstone occur about 10 m and 21 m above base of unit
				Light-colored mudstone, tuffaceous sandstone, orange and white marker beds, colemanite locally in base. Pale-brownish-gray very calcareous mudstone, locally sheared, about 1.5 m above base of unit contains lenses of colemanite as much as 40 cm thick, very sporadic along strike. Orange marker 4.5 m thick at 33 m above base of unit is generally pale yellowish
			A. N. H. N.	orange or dark yellowish orange, ranging to light brown, and contrasts with nearly white underlying altered tuff 1.5 m thick. A grayish-orange sample consists of tuffaceous predominantly medium to fine sand, ranging to finer particles, altered to somewhat varied amounts of (identified by X-ray) authigenic K-feldspar, analcime, gypsum, and having (in thin section) less than 3 percent quartz and feldspar clasts. Commoner light-brown part, as sampled 220 m SE of section,
	1-1		**************************************	consists of unsorted medium sand and finer particles, unevenly stained with limonite and altered to analcime, K-feldspar, and clay; in a local core of yellowish-brown very coarse and finer unsorted sand, including many altered basalt fragments
				(some have analcime and carbonate pseudomorphs of plagioclase laths), analcime greatly exceeds authigenic K-feldspar and montmorillonite. The nearly white underlying tuff is altered to clinoptilolite. Yellowish-gray mudstone of silt and finer particles of (identified by X-ray) quartz, plagioclase, minor dolomite, calcite, illite, contains some white lime-
	150	Tf		stone laminae and more resistant zones (thickest are 8 m and 10 m) of thinly interbedded very calcareous tuffaceous light-gray, fine- grading to medium-grained sandstone. The mudstone, containing some gypsum stringers, is generally concealed by surficial crust on an efflorescence of thenardite, some hydroglauberite, and sporadic ulexite
			× *** × ×	
			*****	可可以使用了不可能的。 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		+		Greatly altered basalt fragmented in mostly sand and pebble sizes, unsorted or poorly sorted where indistinctly stratified; pale olive to light olive gray or dusky yellow; altered to analcime and montmorillonite wherever checked by X-ray diffrac-
1,000	19	Tfa		togram; favored host rock for local veins of priceite and colemanite that by weathering produce friable small-crystal aggregates of rare borate minerals (within 150 m along strike from section: aristarainite, ginorite, gowerite, macallisterite, nobleite, sassolite, sborgite) and most commonly ulexite. At top of unit, local basalt sill in line of section
	14	Tf	S S	is 8.8 m thick; contains colemanite amygdules and veins Very light colored mudstone, silty and sandy laminae; partly contorted; thickness within basalt complex varies along strike
	10	Tfb		Altered basalt in probably penecontemporaneous sill; generally grayish olive to olive gray or medium dark gray where least
				altered but showing in thin section completely altered olivine, pale-olive to moderate olive. Boxwork of very fine grained calcite, enclosing fragments of yellowish-gray altered basalt, and stringers of efflorescent ulexite suggest completely weathered colemanite or priceite veins, which occur along strike
4				Mudstone, generally yellowish-gray or light-greenish-gray, of clay and silt (mainly volcanic-rock derivatives) in various proportions; a few resistant beds of very calcareous tuffaceous sandstone or muddy and sandy limestone; borate zone in
1 16				lower part. Yellowish-gray sandstone, associated with light-olive-gray sandstone about 12 m above base of unit, in a thin section consists of volcanic glass fragments, fine- to coarse-grained, much fewer crystal fragments (quartz, orthoclase, plagioclase, biotite, twinned calcite), mostly fine-grained, and very much finer grained interclast calcite. Very
	102	Tf		light gray impure limestone about 18 m above base of unit and in lower part of 10-m set of more resistant sandy beds about 6 m higher, consists mostly of (in thin section) very fine to fine-grained calcite in cloudy aggregates and 5 to 10 percent fine-grained and smaller fragments of quartz and feldspar. Colemanite zone in limestone and mudstone, poorly exposed is no more than 4 m thick; contains some calestite crystals 2 cm long in clusters; consists of estimated 60 per-
	100			exposed, is no more than 4 m thick; contains some celestite crystals 2 cm long in clusters; consists of estimated 60 percent colemanite in upper 1.5 m about 43 m above base of unit; extends along strike about 350 m SE to Monte Blanco downfaulted major deposit of colemanite enveloping massive ulexite and some probertite
500				Altered amygdaloidal basalt, mostly olive-gray, partly brownish-gray; both are partly analcimized; analcime also in microveins and conspicuous in vesicles along with much less natrolite; veins several centimetres thick of banded calcite (travertine) and some coarse anhedral gypsum, partly dehydrated to bassanite, in brownish-gray basalt, as at 29 m above
166	52	Tfb		base of unit. Basalt at base and middle of unit, about 350 m SE, has reversed polarity of natural remanent magnetization (NRM); at top, anomalous polarity (reversed, inclined about 60°S after correction for dip)
	- 1			
				Muddy, sandy conglomerate and conglomeratic mudstone and sandstone, poorly stratified but containing locally well-stratified mudstone and sandstone, partly very calcareous; pebbles, cobbles, and boulders of volcanic rocks from the Artist Drive
1			0	Formation, of Paleozoic sedimentary rocks (150 m NW along strike, fossiliferous clasts of formations ranging from the Lost Burro to the Keeler Canyon, Devonian to Permian in age), and of Mesozoic(?) granitic and metamorphic rocks, probably reworked from conglomerate in the Artist Drive; finer clasts, tuffaceous, greenish-gray, light-olive-gray, light-brownish-
				gray, or pale-red; less lithified in top 23 m. Base is concordantly on upper sedimentary member of the Artist Drive Formation (Oligocene(?) to Pliocene in age), locally channeled
	113	Tfc		
	-30 m			This is preliminary and has not been reviewed for conformity with
50				U.S. Geological Survey standards and nomenclature.
10		5	18 00	THE RESIDENCE OF THE PARTY OF T